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U. S. DEPARTMENT of AGRICULTURE ★ SOIL CONSERVATION SERVICE
WATER SUPPLY OUTLOOK
FOR
MONTANA

and
FEDERAL-STATE-PRIVATE COOPERATIVE SNOW SURVEYS
Collaborating with
MONTANA AGRICULTURAL EXPERIMENT STATION

AS OF
APR. 1, 1981

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
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**Irrigators May Face
a Water Shortage
This Year**

SNOW COURSE MEASUREMENTS MADE IN MONTANA IN 1981 INDICATE THAT LOW FLOWS WILL OCCUR IN MANY STREAMS. STUDY THE WATER SUPPLY FORECAST CAREFULLY FOR STREAM-FLOW AND/OR RESERVOIR STORAGE FIGURES THAT CONCERN YOUR AREA. KEEP IN TOUCH WITH YOUR IRRIGATION DISTRICT OR OTHER OFFICIALS FOR ESTIMATES OF THE SUPPLY AVAILABLE TO YOU. YOU MAY FIND YOU'LL NEED TO CHANGE CROPS, REDUCE PLANTED ACREAGE, ADJUST TIMING OF WATER APPLICATION, OR IMPROVE EFFICIENCY OF YOUR WATER DISTRIBUTION SYSTEM.

STATEWIDE OUTLOOK

MOUNTAIN SNOWPACK

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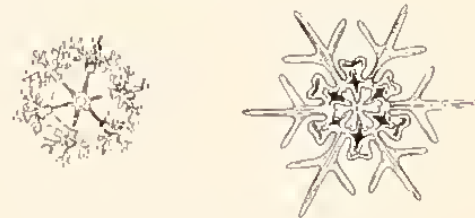
SOIL CONSERVATION SERVICE
P.O. Box 98
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Snowfall during the first half of March was nil. Near mid-month heavy snows fell in the Butte-Anaconda-Helena areas. Small, fast moving storms during the last half of March deposited good snow in the extreme southwest corner, east of Kalispell, and in the Little Belt and Snowy Mountains.

However, most mountainous areas continued to receive deficient moisture during March. About one-third of the snow courses in the state have the lowest water content on record. These new minimums of record are generally in the Gallatin, Yellowstone, Sun, Teton and Marias River drainages east of the Divide, and the Bitterroot, Blackfoot, Kootenai, Flathead, and Rock Creek drainages west of the Divide.

Melt has depleted the low elevation snowpack in many areas with some melt occurring into the mid-elevations.

Most areas continue to show a snowpack around 40 to 60 percent of average. A few areas are in the 70 to 90 percent of average range. A few snow courses along the Continental Divide between Butte and Helena report near average water content as a result of the heavy mid-month storm and a good early season snowpack in this area.



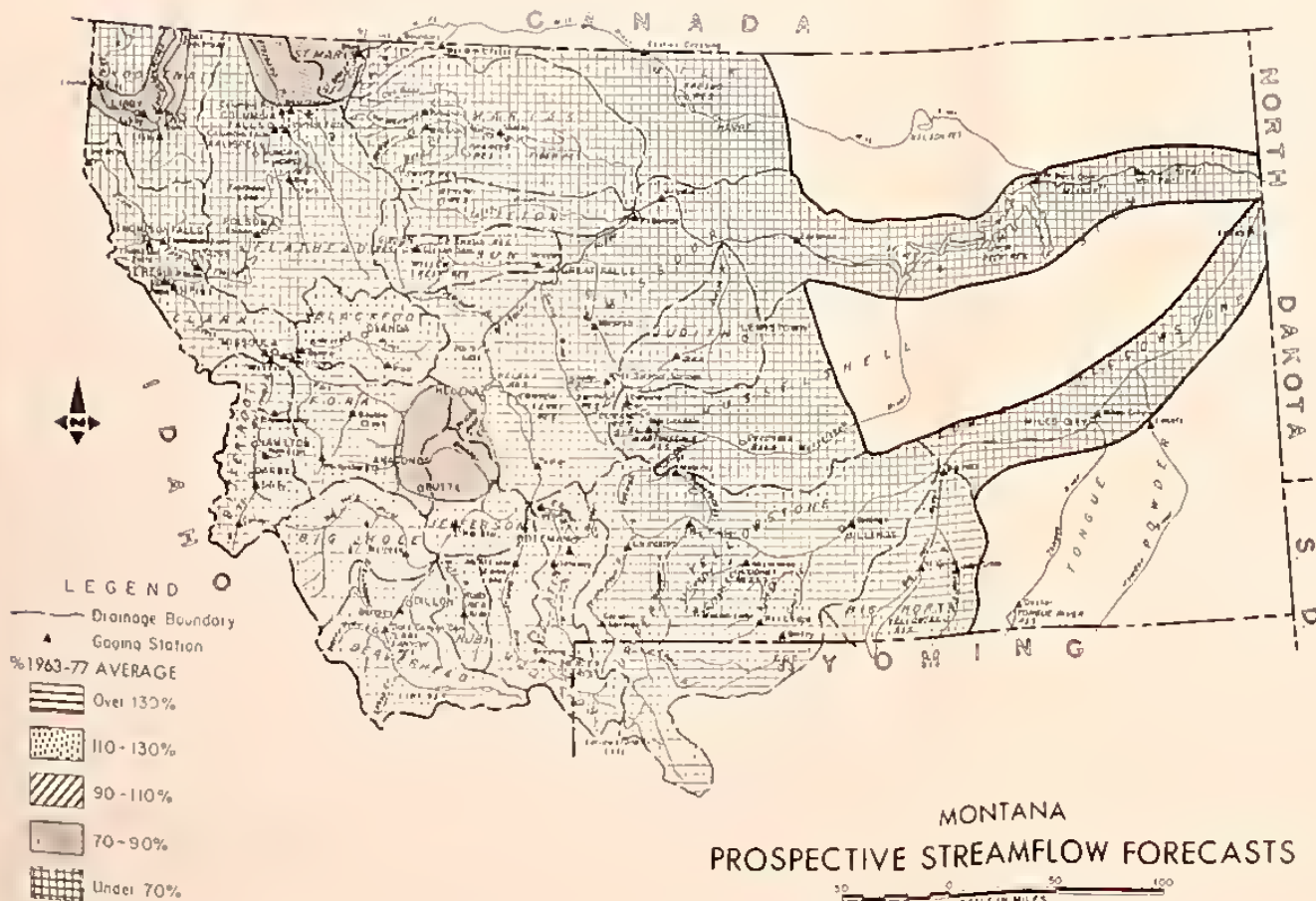
STREAMFLOW FORECASTS

Most streamflow forecasts are down from those issued last month. A little improvement was noted in portions of the Jefferson River drainage, Central Montana, and extreme Upper Clark Fork River.

Most forecasts are in the 50 to 60 percent of average range with a few in the 70's and a few in the 30's and 40's.

Because of the limited snowpack, streams are expected to reach their snowmelt peak earlier than usual and begin receding much sooner than normal.

Irrigation water shortages are expected to develop by mid-June in most drainages not having stored water. These shortages will continue through the irrigation period with many smaller tributaries becoming dry below irrigation diversions.



MONTANA
PROSPECTIVE STREAMFLOW FORECASTS

Columbia River Drainage

STREAMFLOW FORECASTS

BASIN STREAM MILE FORECAST POINT	THIS YEAR				PAST RECORD				THIS YEAR				PAST RECORD			
	FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD	
	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE
PERIOD	APRIL - SEPTEMBER				APRIL - JULY				APRIL - JUNE				APRIL - JUNE			
KOOTENAI RIVER below Libby Dam.....	6,090	84	6,221	7,246	5,190	84	5,429	6,178								
FISHER RIVER near Libby.....	108	40		240	95	38		253								
YAKA RIVER near Troy.....	320	60		537	295	57		514								
KOOTENAI RIVER at Leona (1).....	6,550	74	7,670	8,883	5,690	74	6,771	7,727	4,500	73	5,944	6,150				
INFLOW SLOUTON RESERVOIR at BUTTE (Million Gallons).....	174	61		160	62		387	286			345	260				
WARM SPRINGS CREEK at MEYERS DAM near Anaconda (2).....	34.4	68		50.7	28.5	69	23.5	41.2								
FLINT CREEK near Southern Cross (3).....	9.8	53	29.6	18.5	7.9	51	20.3	15.4								
FLINT CREEK below Boulder Creek (4).....	42.9	55	24.8	77.6	32.5	53		61.3								
MIDDLE FORK WILLOW CREEK RESERVOIR near Hall (5).....	8.8	52		16.9	8.2	51	12.2	16.0								
MIDDLE FORK ROCK CREEK near Philipsburg.....	44.0	56	13.0	78.8	39.0	55		71.1								
NEVADA CREEK at Finn.....	8.4	36		23.6	7.5	34		21.8								
BLACKFOOT RIVER near Bonner.....	530	52		1,017	455	49		920	385	48		794				
CLARK FORK RIVER above Milltown (6).....	590	70		843	505	69		730	415	68		613				
CLARK FORK RIVER above Missoula.....	1,120	60	1,929	1,859	960	58	1,730	1,651	800	57	1,474	1,408				
WEST FORK BITTERROOT RIVER near Conner (7).....	73.0	39		187	65.0	38		172								
BITTERROOT RIVER near Darby.....	250	42		602	225	41		552	200	42		480				
SKALKAHOO CREEK near Hamilton.....	37.5	65		57.4	32.0	64		49.8								
BURNT FORK CREEK near Stevensville.....	24.7	64	43.2	38.8	21.5	64	36.6	33.6								
BITTERROOT RIVER at Missoula (9).....	630	41		1,543	565	40		1,416	500	41		1,211				
CLARK FORK RIVER below Missoula.....	1,750	51		3,405	1,525	50		3,069	1,300	50		2,618				
CLARK FORK RIVER at St. Regis.....	2,090	46	4,348	4,521	1,860	46	3,938	4,078	1,580	45	3,418	3,492				
NORTH FORK FLATHEAD RIVER near Columbia Falls.....	1,450	74		1,969	1,310	74		1,782	1,110	74		1,498				
MIDDLE FORK FLATHEAD RIVER near West Glacier.....	1,275	67	1,747	1,911	1,180	67	1,576	1,750	1,000	68	1,412	1,470				
SOUTH FORK FLATHEAD RIVER near Columbia Falls.....	1,500	65		1,946	1,380	64	1,808	2,159	1,200	64	1,652	1,884				
FLATHEAD RIVER at Columbia Falls (10).....	4,350	69		6,330	4,000	69	4,903	5,827	3,450	70	4,443	4,064				
SWAN RIVER near Big Fork.....	445	65		681	390	65		596								
FLATHEAD RIVER near Polson (11).....	4,950	67	6,382	7,394	4,570	67	5,787	6,806	4,000	69	5,159	5,779				
CLARK FORK RIVER near Plains (11).....	7,220	59	11,550	12,340	6,560	58	10,462	11,222	5,500	58	9,163	9,507				
THOMPSON RIVER near Thompson Falls.....	153	58		263	130	56		234								
PROSPECT CREEK at Thompson Falls.....	67.0	47		143	62.0	47		133								
CLARK FORK RIVER at Whitehorse Rapids.....	7,850	57		13,781	7,130	57		12,519	6,000	56		10,633				

- Adjusted for storage in Lake Kootenai
- Adjusted for storage in Silver Lake diversions to and pumping from Georgetown Lake
- Adjusted for storage in Georgetown Lake diversions from and pumping to Silver Lake
- Sum of Flint Creek at Marville and Boulder Creek at Marville
- Sum of North Fork Willow Creek near Hall and South Fork Willow Creek near Hall
- Difference in observed flow Clark Fork above Missoula and Blackfoot near Bonner
- Adjusted for storage in Painted Rocks Reservoir
- Adjusted for diversion into Sturges Highway Canal
- Difference in observed flow Clark Fork above and below Missoula
- Adjusted for storage in Hungry Horse Reservoir
- Adjusted for storage in Hungry Horse Reservoir and Flathead Lake
- Adjusted for storage in Hungry Horse Reservoir, Flathead Lake and Nez Perce Reservoir

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

MOUNTAIN SNOWPACK

Some small areas showed good snowfall during the last half of March but most drainages continued to receive below average moisture. The first half of March was very dry with very little precipitation anywhere in the state. The area around Butte, Anaconda and Helena received heavy snowfall near mid-month. Snowpack in this area is now near average at a few low elevation locations. Good snowfall also developed along the north end of the Flathead and Swan Ranges east of Kalispell. Other areas did not receive much snowfall, and nearly one-half of the snow courses in the Columbia River drainage in Montana have the lowest water content of record. Warm temperatures have been depleting the snowpack in lower elevations.

Soil moisture in mountainous areas is generally good due to recent snowmelt and rainfall. Valley soils are beginning to dry.

SUMMARY OF SNOW MEASUREMENTS

RIVER BASIN AND SUB-DRAINAGE	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF	
		LAST YEAR	AVERAGE
Kootenai/BC	26	79	78
Kootenai/Montana	20	77	56
Kootenai	46	78	66
Little Bitterroot	5	52	44
Flathead	31	87	68
Clark Fork above			
Blackfoot	32	84	68
Blackfoot	17	68	54
Clark Fork above			
Missoula	49	78	62
Missoula	10	62	51
Lower Clark Fork			
below Missoula	12	68	53
Clark Fork (Total w/o Flathead) ..	71	72	57
Pend O'Reille			
(Clark Fork & Flathead)	102	78	62
Columbia (Pend O'Reille & Kootenai)	117	75	61

WATER SUPPLY OUTLOOK

STREAM or AREA	Flow Profile	
	Spring Season	Late Season
Tobacco	Fair	Fair
Little Bitterroot ..	Fair	Poor
Missoula Valley	Fair	Fair
Flint Creek	Fair	Fair
Upper Clark Fork ...	Avg	Fair
Nevada Creek	Fair	Fair
Blackfoot	Fair	Poor
West-side Bitterroot ..	Fair	Poor
East-side Bitterroot ..	Fair	Poor
Bitterroot River ...	Fair	Poor
Lower Clark Fork ...	Fair	Poor

STREAMFLOW FORECASTS

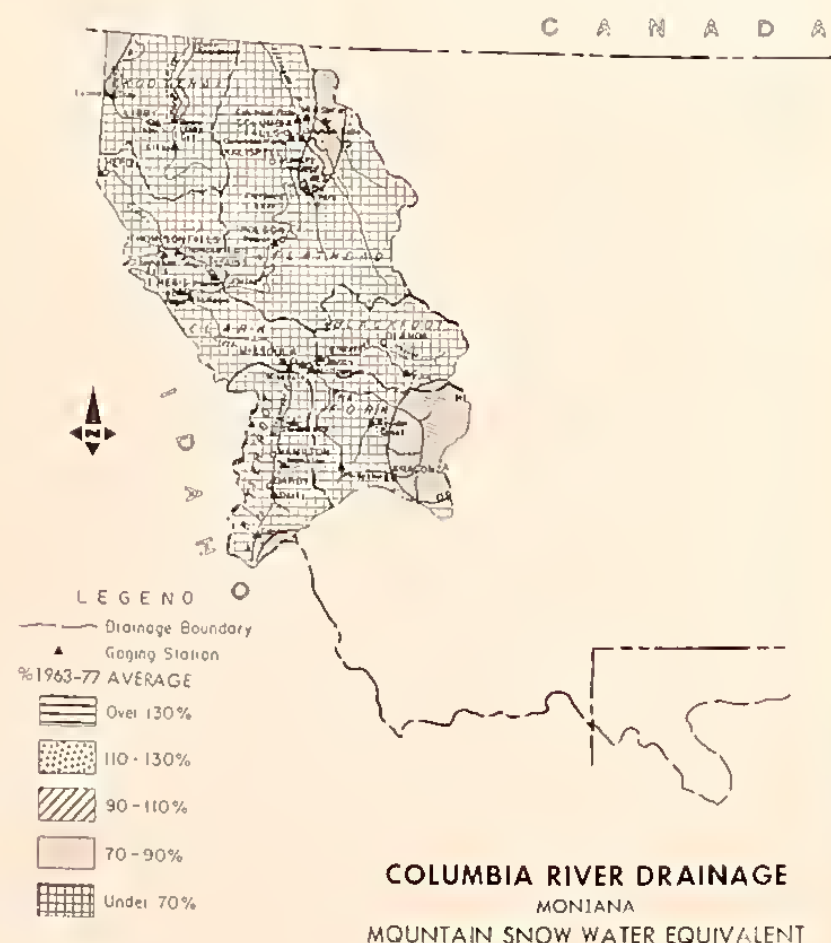
With the exception of the extreme headwaters of the Clark Fork, water supply outlook deteriorated during March. Most forecasts are about 5 percent lower than those issued last month.

In the Upper Clark Fork, forecasts are similar to or up to 5 percent above those made last month.

The Bitterroot River near Darby is forecast to have the lowest runoff of record with records beginning at this station in 1937. Other tributary streams to the Bitterroot River are predicted to have the 2nd to 4th lowest runoff of record.

Streamflow in the Blackfoot and Lower Clark Fork River drainages is expected to be about 5th to 7th lowest of record but more than the low runoff of 1977. The Flathead River and its tributaries should have between the 5th to the 8th lowest runoff measured in the last 50 years.

Irrigation water supplies are expected to be short by mid-June on many streams not having stored water. Streams will rise as temperatures warm and snowmelt begins. They are expected to reach their peak snowmelt runoff earlier and be at much lower levels than usual.



COLUMBIA RIVER DRAINAGE
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT

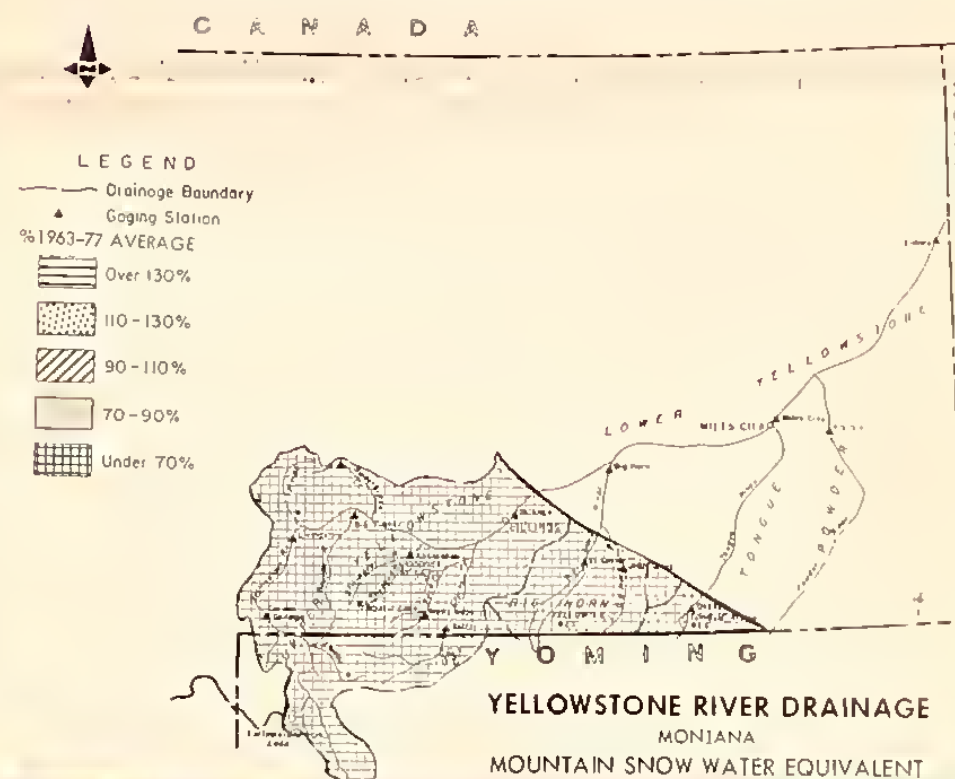
Yellowstone River Drainage

STREAMFLOW FORECASTS

BASIN STREAM MILE FORECAST POINT	THIS YEAR				PAST RECORD				THIS YEAR				PAST RECORD			
	FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD	
	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE	THOUSAND CFS	PERCENT OF AVERAGE
PERIOD	April - September				April - July				April - June				April - June			
YELLOWSTONE RIVER at Corwin Springs.....	1,250	59	1,626	2,102	1,011	59	1,326	1,749								
YELLOWSTONE RIVER near Livingston.....	1,370	55		2,471	1,120	55		2,048								
BOULDER RIVER at Big Timber.....	213	51		416	195	51		382								
STILLWATER near Absarokee (1).....	335	51		640	270	49		555								
CLARK'S FORK RIVER near Belfry.....	365	57		644	325	58		564								
ROCK CREEK near Red Lodge.....	69.0	58	131	118	50.0	55		104	91.4							
INFLOW COONEY RESERVOIR near Boyd (2).....	24.0	37		64.5	18.0	34		52.5								
YELLOWSTONE RIVER at Billings.....	2,401	51	3,969	4,682	1,900	50	3,377	3,979								
BIGHORN RIVER near St. Xavier (3).....	1,120	55	1,611	2,034	1,000	54	1,457	1,861								
LITTLE BIGHORN RIVER near Hardin.....	107	55		196	96.0	55		174								
YELLOWSTONE RIVER at Miles City (4).....	3,508	49		7,142	3,000	48		6,243								
YELLOWSTONE RIVER near Sidney (5).....	3,777	48		7,806	3,200	47		6,805								

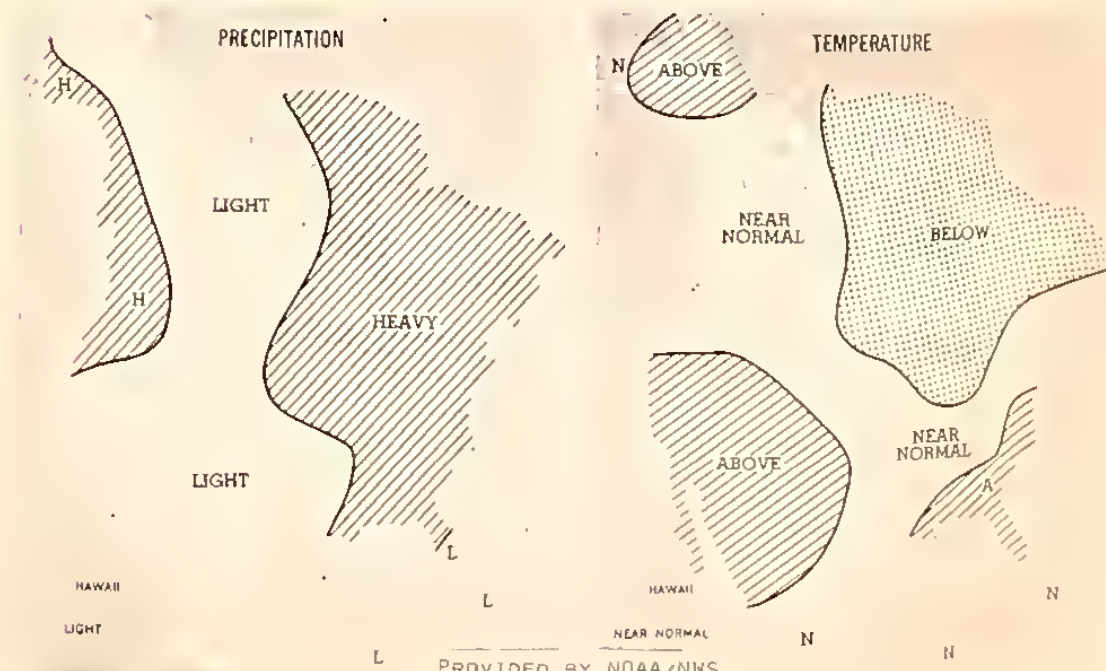


Avalanches are but one of the hazards snow surveyors must contend with to obtain snow survey readings.



average monthly weather outlook

FOR APRIL 1981



PROVIDED BY NOAA/NWS

WATER SUPPLY OUTLOOK

STREAM or AREA	Flow Profile	
	Spring Season	Late Season
Yellowstone at Livingston	Fair	Poor
Shields	Fair	Poor
Boulder	Fair	Poor
Sweetgrass - Big Timber	Fair	Poor
Stillwater	Fair	Poor
Rock Creek	Fair	Poor
Clark's Fork	Fair	Poor
Yellowstone above Bighorn	Fair	Poor
Bighorn	Fair	Poor
Little Bighorn	Poor	Poor
Tongue	Fair	Poor
Powder	Fair	Poor
Lower Yellowstone ...	Fair	Poor

STREAMFLOW FORECASTS

Streamflow forecasts are about 5 percent lower than those issued last month. Runoff is expected to be similar to 1977 which was one of the lowest years in recent times. At Corwin Springs, the runoff was lower in 1919, 1931, 1934, 1941, and 1977. At Livingston, the runoff in 1977 was the only year lower than the flow forecasted for this year. The Boulder River forecast is for the lowest runoff of record and a little lower than 1977. Records began in 1947. The Stillwater River had lower flows in 1936, 1939, 1960, and 1977. The forecasts on the Clark's Fork and Rock Creek are the second lowest of record being lower only in 1977. The inflow to Cooney Reservoir forecast is for the 6th lowest of record. At Billings, the Yellowstone recorded slightly lower runoff in 1961 and 1977.

Streams are expected to rise as snowmelt begins, but begin dropping much sooner than usual. By late June or early July, the Yellowstone River is expected to be quite low and remain low until fall. Many of the smaller tributaries could be low by mid-June if spring rains are deficient. Irrigation water supplies are expected to be limited on most smaller streams. Some problems may occur on diversions from the Yellowstone River where the river water level may fall below the level of the irrigation canals.

SUMMARY OF SNOW MEASUREMENTS

RIVER BASIN AND SUB-DRAINAGE	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF	
		LAST YEAR	AVERAGE
Upper Yellowstone ..	15	64	54
Shields	6	85	68
Boulder			
Stillwater	3	67	52
Rock Creek			
Clark's Fork	11	61	57
Yellowstone (ab Bighorn River) ..	35	67	57
Bighorn/Wyoming ..	29	61	59
Little Bighorn ..	4	54	40
Bighorn (Total) ..	33	63	57
Tongue	10	65	40
Powder	7	66	60
Yellowstone (Total)	85	65	56

Soil moisture is good in exposed areas where recent melt helped recharge soils. Very little snowmelt runoff has occurred. Presently most headwater areas have 40 to 50 percent of average snowpack with a few areas in the low 60's.



SNOTEL sites transmit readings daily on snow water content, precipitation and air temperatures. There are now 63 sites in Montana reporting data. This data is used by many groups and agencies to keep abreast of changes that are taking place in the mountains between monthly snow surveys.

SNOW SURVEY DATA

SNOW April 1, 1981									
DRAINAGE BASIN and/or SNOW COURSE									
NAME	Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)
ABOVE BURKE (ID)	4100	3/31	25	8.4	17.4	24.7			
ABUNDANCE LAKE	8800	4/02	61	15.5	19.4	22.5			
AMBROSE	6480	3/26	25	6.7	12.7	14.4			
ARCH FALLS	7350	3/31	28	6.6	12.8	14.4			
ASHLEY DIVIDE	4820	3/31	5	1.5	-	-			
ASILEY LAKE	4000	3/31	5	2.0	-	-			
BAOGER PASS	6900	3/28	74	26.1	31.9	41.7			
BADGER PASS PILLW	6900	3/28	SP	24.8	6.8	-			
BALO EAGLE PEAK	5700	4/02	107	39.3	48.9	64.7			
BALD MOUNTAIN (WY)	9380	3/25	46	9.8	15.3	25.2			
BALD RIDGE	7500	4/03	37	10.3	12.1	14.6			
BANFIELD MOUNTAIN	5600	4/02	43	15.0	16.6	25.8			
BANFIELD MOUNTAIN PILLW	5600	4/02	SP	15.4	17.3	22.5			
BARRE CREEK	5500	3/31	73	28.0	37.5	50.3			
BARRE MIDWAY	4600	3/31	49	16.1	32.4	38.8			
BARRE TRAIL	3800	3/31	1	.5	7.8	9.8			
BARKER LAKES	8250	4/07	49	13.6	11.8	-			
BARKER LAKES PILLW	8250	4/07	SP	14.5	12.7	-			
BASIN CREEK	7180	3/27	39	9.3	7.4	8.4			
BASIN CREEK PILLW	7180	3/27	SP	9.0	6.7	-			
BASSOO PEAK	5150	4/01	10	3.1	8.8	11.5			
BEAGLE SPRINGS	8850	3/29	39	9.8	11.0	-			
BEAGLE SPRINGS PILLW	8850	3/29	SP	8.8	9.9	-			
BEAR BASIN	8150	4/02	58	16.2	20.0	23.3			
BEAR MOUNTAIN (ID)	5400	4/02	113	41.9	47.6	64.2			
BEAR PAW SKI AREA	5200	3/31	9	2.1	4.6	7.3			
BEAVER LAKE	5900	3/28	40	12.8	18.7	25.8			
BERRY MEADOW	7000	4/02	20	5.8	7.8	8.4			
BIG CREEK	6750	3/28	86	33.8	46.9	47.6			
BIG SKY	7700	3/30	38	11.0	14.6	17.3			
BIG SKY MEADOW	6350	4/02	21	5.9	10.0	10.0			
BIG SNOWY	7150	3/30	55	18.7	-	24.1			
BIG SPRINGS (ID)	6500	4/01	38	12.9	18.7	22.0			
BLACK BEAR	7950	3/26	73	27.2	39.8	44.1			
BLACK BEAR PILLW	7950	3/26	SP	25.2	35.0	40.0			
BLACK CANYON (ID)	7850	4/01	72	24.4	34.8	35.4			
BLACK MOOSE (IO)	8120	4/01	70	25.2	37.0	40.3			
BLACK MOUNTAIN	7750	4/03	59	15.8	17.3	-			
BLACK PINE	7100	3/30	30	7.7	10.0	15.5			
BLACK PINE PILLW	7000	3/30	SP	11.0	11.3	16.0			
BLOODY OCK	7600	3/31	37	11.0	12.0	14.8			
BLOODY OCK PILLW	7600	3/31	SP	10.2	10.4	-			
BLUE LAKE	5900	3/28	46	15.6	21.1	28.0			
BLUE LEDGE MINE (ID)	6700	3/30	35	11.0	14.4	17.7			
BOIS SOTS	8000	3/31	11	3.6	9.2	9.1			
BOULDER MOUNTAIN	7950	3/30	58	16.7	16.0	20.7			
BOULDER MOUNTAIN PILLW	7950	3/30	SP	18.7	17.8	-			
BOX CANYON	6670	3/30	22	4.5	11.4	14.2			
BOX CANYON PILLW	6670	3/30	SP	4.5	10.1	-			
BRANHAM LAKES	8850	3/27	77	26.4	24.4	31.9			
BRIDGER BOWL	7250	4/01	62	19.7	23.1	30.2			
BRIDGER BOWL PILLW	7250	4/01	SP	22.2	20.4	29.5			

SNOW April 1, 1981									
DRAINAGE BASIN and/or SNOW COURSE									
NAME	Elevation	Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)	Water Content (Inches)
EL DORADO MINE	7800	4/02	70	18.4	15.4	23.8			
EEL HORN SPRINGS	7800	4/02	27	5.8	7.7	10.1			
ELK PEAK	8000	4/01	55	15.8	16.0	18.7			
EMERY CREEK	4350	4/01	33	11.2	11.6	17.1			
EMERY CREEK PILLW	4350	4/01	SP	12.0	12.9	-			
FATTY CREEK	5500	3/28	44	16.3	24.8	25.1			
FISH CREEK	8000	3/27	43	9.8	8.2	9.8			
FISHER CREEK	9100	3/27	71	24.4	35.3	41.3			
FISHER CREEK PILLW	9100	3/27	SP	22.4	32.2	38.7			
FIVE-BULL	5700	4/02	3	.6	5.9	7.6			
FIVE SPRINGS FALLS (WY)	7620	3/30	10	2.6	5.2	8.4			
FLATTOP MOUNTAIN PILLW	6300	4/01	SP	42.5	45.3	51.6			
FLEECER RIDGE	7500	4/01	30	8.0	10.2	12.2			
FOOLHEN	8280	4/02	55	13.2	14.5	19.1			
FOREST LAKE	6400	3/31	29	7.8	12.2	12.3			
FOUR MILE	6900	3/30	21	6.4	8.2	9.3			
FOURTH OF JULY	3450	3/30	0	.0	6.8	-			
FRED BURR PASS	8000	3/27	69	19.0	20.8	27.7			
FREIGHT CREEK	6000	3/28	23	7.4	13.2	17.2			
FRIQAY HILL	4620	3/30	31	11.4	17.4	-			
FROHNER MEADOWS	6480	3/30	19	4.8	8.0	9.2			
FROHNER MEADOWS PILLW	6480	3/30	SP	8.5	8.9	10.0			
GARVER CREEK	4250	4/02	15	6.1	7.7	12.0			
GARVER CREEK PILLW	4250	4/02	SP	6.3	10.8	10.8			
GIBBONS PASS	7100	3/26	53	17.8	20.4	24.8			
GOAT MOUNTAIN	7000	3/27	15	3.4	8.4	11.6			
GOLD CREEK LAKE	7200	4/02	47	12.4	11.8	17.7			
GOLD STONE	8100	3/31	49	15.0	14.8	18.9			
GRASSHOPPER	7000	4/01	16	4.2	6.7	6.4			
GRAVE CREEK	4300	4/02	24	9.7	11.6	19.2			
GRAVE CREEK PILLW	4300	4/02	SP	8.1	13.1	18.7			
GRIFFIN CREEK DIVIOE	5150	4/01	24	6.7	11.4	12.2			
GRIZZLY PEAK	8400	3/30	40	11.5	19.2	17.9			
GUNSIGHT LAKE	6300	3/28	66	24.6	32.4	42.7			
HALVERSON CREEK (ID)	4550	4/02	99	36.4	41.2	44.2			
HAND CREEK	5030	3/30	35	9.4	12.2	14.1			
HAND CREEK PILLW	5030	3/31	SP	10.4	7.7	-			
HAWKINS LAKE	6450	4/02	67	25.1	27.1	34.2			
HAWKINS LAKE PILLW	6450	4/02	SP	22.3	28.4	31.6			
HAYHAKER	8050	4/01	39	9.4	-	13.8			
HEART LAKE TRAIL	4800	3/31	28	8.2	18.4	23.8			
HEBGEN DAM	6550	3/30	27	7.7	11.1	12.5			
HELL ROARING DIVIOE	5770	3/31	62	22.2	25.1	34.4			
HERRICK JUNCTION	4850	3/31	55	18.3	21.8	-			
HOLBROOK	4530	3/28	6	2.6	6.9	10.7			
HOOD MEADOW	6600	3/30	18	5.4	11.3	12.4			
HOODOO BASIN	6000	3/31	97	34.4	47.2	53.6			
HOODOO BASIN PILLW	6000	3/31	SP	31.4	41.4	51.9			
HOODOO CREEK	5900	3/31	84	28.5	42.8	49.9			
INDEPENDENCE	7850	3/30	36	10.4	15.8	20.3			
INTERGAARD	6450	3/31	23	6.6	8.0	9.4			
ISLAND PARK (IO)	6310	4/01	32	10.7	16.0	17.2			
JACK CREEK	7500	3/30	12	2.8	8.5	6.5			
JAHNIKE LAKE TRAIL	7200	3/31	28	7.4	10.5	10.5			
JOHNSON PARK	6450	3/27	5	1.8	6.1	7.1			
KEELER CREEK	3300	4/02	0	.0	8.4	11.5			

SNOW SURVEY DATA

** CONTINUED **

SNOW		April 1, 1981		THIS YEAR		PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE				Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)
NAME	Elevation	Year	Water Content (Inches)				
NEVADA CREEK PILLW	6480	4/02	SP	11.8	-	-	-
NEW WORLD	6900	4/01	35	12.3	15.4	17.3	-
NEWTON MOUNTAIN	5600	3/30	71	28.2	30.7	-	-
NEZ PERCE CAMP	5580	3/28	28	8.8	13.2	16.3	-
NEZ PERCE CAMP PILLW	5580	3/28	SP	9.3	12.6	-	-
NEZ PERCE CREEK	6500	3/30	18	4.9	7.6	7.7	-
NEZ PERCE PASS	6570	3/28	28	8.8	13.8	19.0	-
NOISY BASIN	6040	4/01	135	47.3	39.9	48.2	-
NOISY BASIN PILLW	6040	4/01	SP	41.6	33.6	41.2	-
NORRIS BASIN (WY)	7500	3/31	24	5.6	9.5	11.8	-
NORTH FK. ELK CREEK	6250	3/31	25	6.8	11.2	13.9	-
NORTH FK. ELK CREEK PILLW	6250	3/31	SP	8.4	12.1	14.4	-
NORTH FORK JOCKO	6330	4/02	103	32.0	35.9	48.4	-
NORTH MEADOW	7500	3/30	21	5.9	8.4	9.4	-
NORTHEAST ENTRANCE	7400	4/02	18	4.0	7.6	10.4	-
NORTHEAST ENTRANCE PILLW	7400	4/02	SP	5.9	8.9	9.8	-
NOTCH	8500	3/29	45	12.4	22.8	17.5	-
OLD FAITHFUL (WY)	7400	4/01	35	9.7	15.8	-	-
OPHIR PARK	7150	3/30	55	16.6	15.2	21.1	-
PALISADE CREEK	8250	4/01	76	21.8	26.6	33.1	-
PETERSON MEADOWS	7200	3/26	27	7.2	9.1	11.5	-
PETERSON MEADOWS PILLW	7200	3/26	SP	8.9	8.4	12.0	-
PICKET PIN LOWER	6200	4/01	0	.0	-	2.4	-
PICKET PIN MIDDLE	7250	4/01	13	4.5	18.8	13.3	-
PICKET PIN UPPER	3100	4/01	48	14.3	25.8	23.1	-
PICKFOOT CREEK	6650	3/30	19	7.0	9.0	-	-
PICKFOOT CREEK PILLW	6650	3/30	SP	6.4	8.8	-	-
PICNIC GROUNDS	6200	3/31	12	2.4	4.5	4.9	-
PIPESTONE PASS	7200	3/30	17	3.9	6.0	6.2	-
PLACER BASIN PILLW	8830	4/01	SP	12.3	-	-	-
POORMAN CREEK	5100	4/02	54	19.5	24.6	38.0	-
POORMAN CREEK PILLW	5100	4/02	SP	17.3	21.4	34.3	-
PORCUPINE	6500	4/03	19	5.4	7.4	8.8	-
PORCUPINE PILLW	6500	4/03	SP	5.2	8.0	-	-
POTOMACETON PARK	7150	3/30	29	8.2	12.1	15.9	-
RED MOUNTAIN	6000	3/31	39	13.3	19.0	20.6	-
RED TOP	5260	3/30	58	21.6	26.0	-	-
ROCK CREEK	5600	3/30	18	5.9	11.2	11.0	-
ROCK CREEK MEADOWS	8160	4/01	56	14.5	18.4	24.8	-
ROCKER PEAK	8000	4/02	53	15.7	15.5	16.5	-
ROCKER PEAK PILLW	8000	4/02	SP	15.6	15.2	16.2	-
ROCKY BOY	4700	3/31	6	1.0	3.4	4.8	-
ROCKY BOY PILLW	4700	3/31	SP	1.8	5.6	5.0	-
SACAJAWEA	6550	4/01	36	12.0	13.6	16.1	-
SADOLE MOUNTAIN	7940	3/26	62	19.9	20.5	27.3	-
SADDLE MOUNTAIN PILLW	7940	3/26	SP	19.6	20.1	28.6	-
SAVAGE PASS (ID)	6600	3/31	52	17.6	24.8	28.6	-
SAWTELL MOUNTAIN (10)	8720	3/31	78	26.0	35.5	35.1	-
SENTINEL CREEK	8300	3/30	56	16.7	21.2	25.1	-

Missouri River & Hudson Bay Drainages

STREAMFLOW FORECASTS

BASIN, STREAM AND FORECAST POINT	THIS YEAR FORECAST				PAST RECORD			
	Estimated Runoff	In % of Normal	Low Flow	High Flow	Estimated Runoff	In % of Normal	Low Flow	High Flow
	APRIL - SEPTEMBER				APRIL - JULY			
RED ROCK RIVER near Monida (1)	76.8	70	113	110	72.0	70	102	103
BEAVERHEAD RIVER near Grant (2)	85.5	50	193	171	77.0	52	162	148
BEAVERHEAD RIVER at Barratts (2)	129	57		226	107	55		196
RUBY RIVER near Alder	69.0	66		792	56.0	63		89.0
BIG HOLE RIVER near Melrose	440	56		105	410	56		730
BOULDER RIVER near Boulder	85.0	83	145	103	82.0	84	132	96.7
WILLOW CREEK near Harrison	9.8	46		21.5	8.8	46		19.2
MADISON RIVER near Grayling (3)	320	61	432	573	245	60	328	409
MADISON RIVER near McAllister (4)	565	63	751	892	451	64	646	706
GALLATIN RIVER near Gallatin Gateway	303	53		572	260	53		488
INFLUX MIDDLE CREEK RESERVOIR near Bozeman (5)	16.0	53		30.3	13.8	53		26.2
HYALITE CREEK near Bozeman (6)	25.4	54		47.4	22.0	54		41.0
GALLATIN RIVER at Logan	230	35		669	185	33		557
MISSOURI RIVER at Toston (7)	1,309	49	2,743	2,671	1,150	49	2,377	2,330
SHEEP CREEK near White Sulphur Springs	14.3	63	13.0	22.8	12.2	62		10.6
SUN RIVER at Gibson Dam (8)	286	49	520	580	260	49	473	529
BELT CREEK near Monarch	75.0	51		146	67.0	50		134
MISSOURI RIVER at Fort Benton (9)	1,846	45		4,148	1,620	44		3,640
THO MEDICINE CREEK near Browning (1)	144	56		259	135	55		244
BADGER CREEK near Browning	77.0	58		133	66.0	57		116
MARIAS RIVER near Shelby	288	50	481	577	260	49	444	532
MISSOURI RIVER at Virgelle (11)	2,089	44		4,793	1,820	43		4,238
MISSOURI RIVER near Landusky (11)	2,298	44		5,214	2,020	44		4,586
NORTH FORK MUSSELSHELL RIVER near Delpine	4.3	67		6.4	3.6	65		5.5
SOUTH FORK MUSSELSHELL RIVER near Martinsdale	34.5	56		61.5	33.4	58		57.6
MISSOURI RIVER below Fort Peck Dam (11)	2,112	43		4,929	1,900	43		4,381
MILK RIVER at Eastern Crossing	224	90		250				
MILK RIVER at Eastern Crossing (13)	39	47		83				
INFLUX LAKE SAKAKAWA, ND (11)	6,050	45		13,450	5,550	45		12,239

SASKATCHEWAN RIVER BASIN

SWIFTCURRENT CREEK at Sherburne (12)	97.8	74	116	132	85.0	74	98.5	115
ST. MARY'S RIVER near Babb (12)	376	76		498	318	75		426



Each winter near the first of the month over 100 snow surveys travel by skis, snowshoes, snow machines and helicopters to snow courses in Montana to measure the depth and water content of the mountain snowpack. Hydrologists are able to predict runoff that will come from the melting snow by comparing previous snow measurements and soil moisture with the runoff that was measured in previous years. Presently there are about 250 snow courses in Montana.

MOUNTAIN SNOWPACK

Some areas show improved snowpack conditions. Areas near the Continental Divide in the Big Hole and Beaverhead River headwaters, Boulder River and Prickly Pear Creek headwaters, the Little Belt and Snowy Mountains all received significant snowfall the last half of March. These areas now have a snowpack in the 70 - 80 percent of average range. Elsewhere, the snowpack remained about the same as a month ago. Many locations in the Gallatin River drainage and Sun, Teton and Marias have the lowest water content of record with many of these records extending back 40 to 50 years.

The first half of March was dry. Snows occurred in the Helena-Butte area near mid-month, and small storms later in the month dropped some moisture elsewhere. Temperatures have remained warm with melt occurring at lower elevations and on south facing slopes.

Moisture in the soil under the snowpack and in areas where recent moisture fell and melt has occurred is good. Many valley areas are beginning to dry.

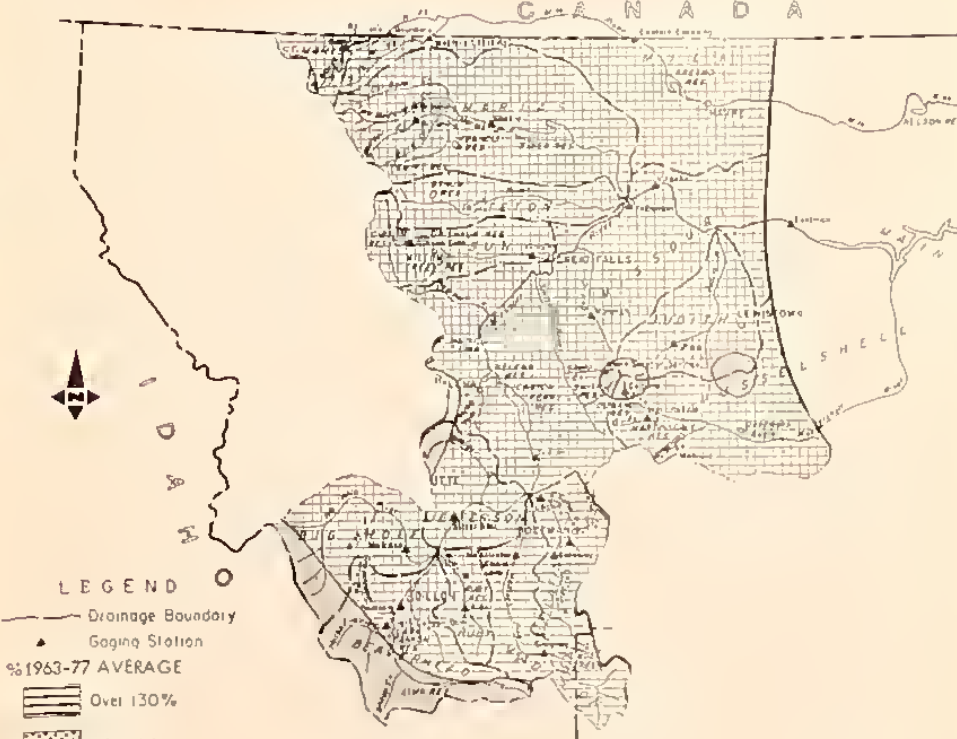
SUMMARY OF SNOW MEASUREMENTS

RIVER BASIN SUBWATERSHED	Number of Courses Averaged	THIS YEAR'S SNOW WATER AS PERCENT OF	
		1963-77 AVERAGE	1963-77 AVERAGE
Beaverhead	17	80	72
Ruby	10	83	72
Big Hole	19	85	68
Boulder	12	91	79
Jefferson	58	84	72
Madison	21	71	61
Gallatin	18	71	59
Missouri Headwater	97	78	66
West-side Missouri (Toston-Cascade)	7	96	80
Smith & Belt	8	99	75
Missouri Main-stem	15	98	77
Teton & Sun	7	45	35
Marias	4	72	55
Marias-Teton-Sun	11	59	45
Judith	8	82	66
Musselshell	11	83	67
Judith-Musselshell	19	82	66
Milk	6	63	41
Bear Paws	5	57	26
Missouri (Total)	142	78	65

SASKATCHEWAN

St. Mary's	3	82	70
Bow River in Alberta	7	90	94

STREAM or AREA	Snow Water Supply Outlook	
	Spring Season	Late Season
Beaverhead	Fair	Fair
Ruby	Fair	Fair
Big Hole	Fair	Poor
Boulder	Fair	Fair
Jefferson	Fair	Poor
Madison	Fair	Poor
Gallatin	Fair	Poor
West-Side Missouri	Avg	Fair
Smith-Belt	Fair	Fair
Sun	Poor	Poor
Teton	Poor	Poor
Marias	Poor	Poor
Judith	Fair	Fair
Musselshell	Fair	Fair
Milk	Poor	Poor
Bear Paws	Poor	Poor
St. Mary's	Fair	Fair



MISSOURI RIVER & HUDSON BAY DRAINAGES
MONTANA
MOUNTAIN SNOW WATER EQUIVALENT

SNOW PILLOW DATA

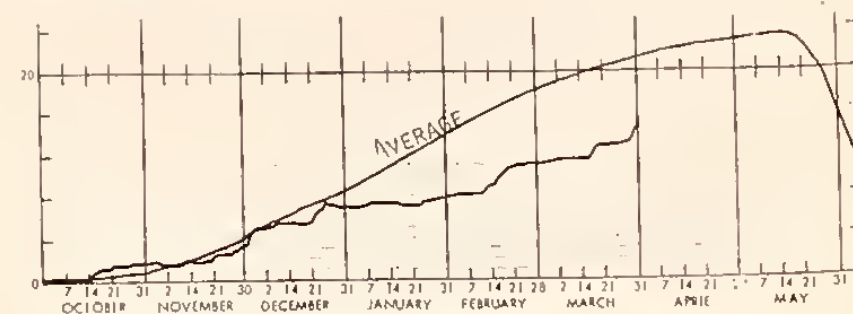
SNOW PILLOW RECORDS

Snow pillows have been installed at about 30 percent of the snow measuring sites in Montana. These pillows provide a continuous record of snowpack accumulation and melt.

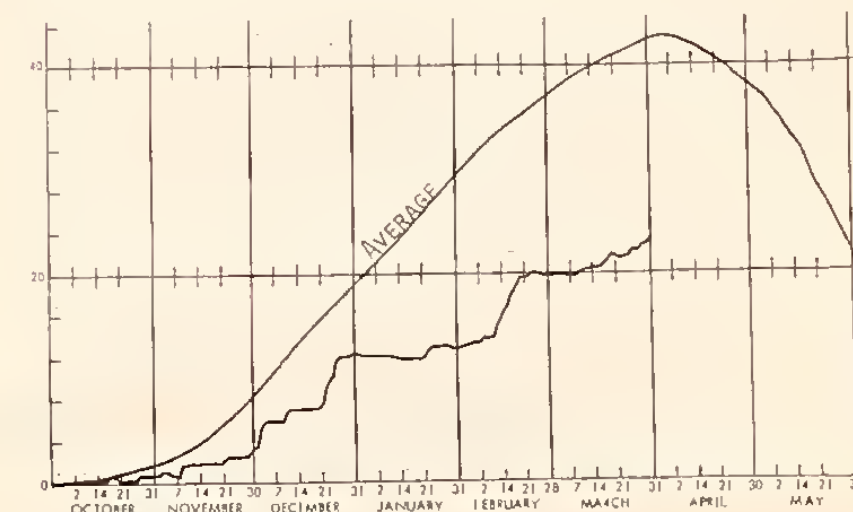
In the past, the snow water content on these pillows was shown for most locations with 2 or 3 sites shown on each graph. This showed the accumulation and melt but did not provide any comparison with the average.

This year, individual sites are graphed, with average snow water content shown for comparison. In most cases the high elevation sites which most nearly represent the snowpack conditions in a drainage have been selected.

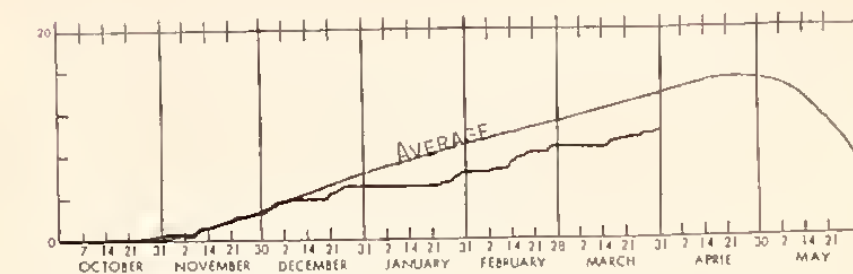
We hope this will provide a more useful graphic representation of snowpack conditions.



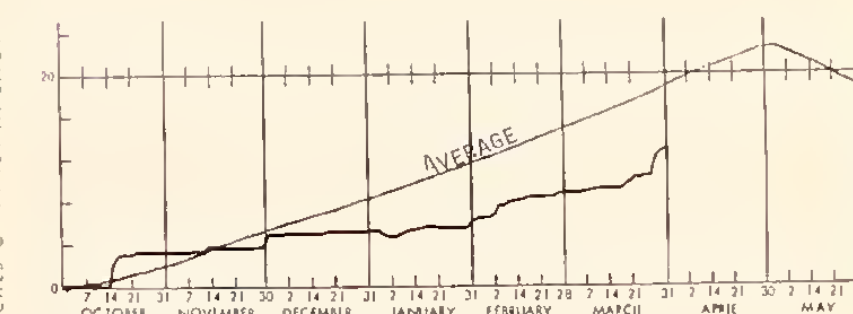
MOUNT LOCKHART, elevation 6,400 ft.
Flathead - Marias - Teton River Drainages



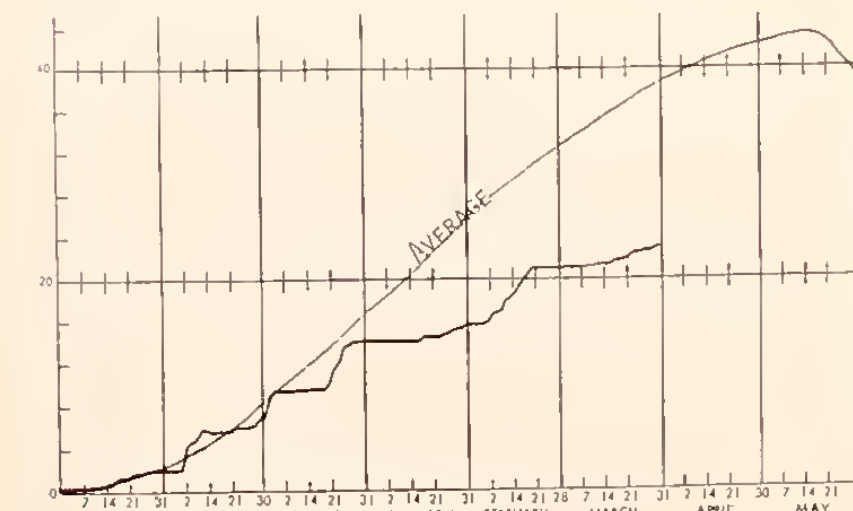
COPPER CAMP, elevation 6,950 ft.
Blackfoot River Drainage



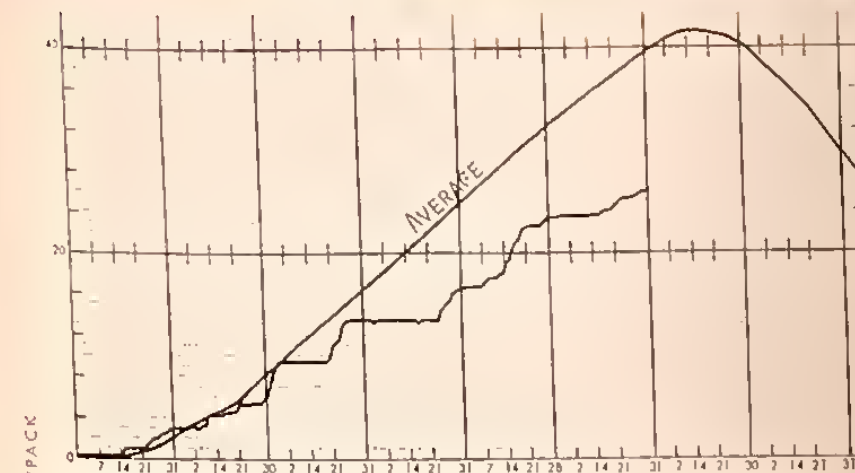
TEPEE CREEK, elevation 8,000 ft.
Madison - Beaverhead - Ruby River Drainages



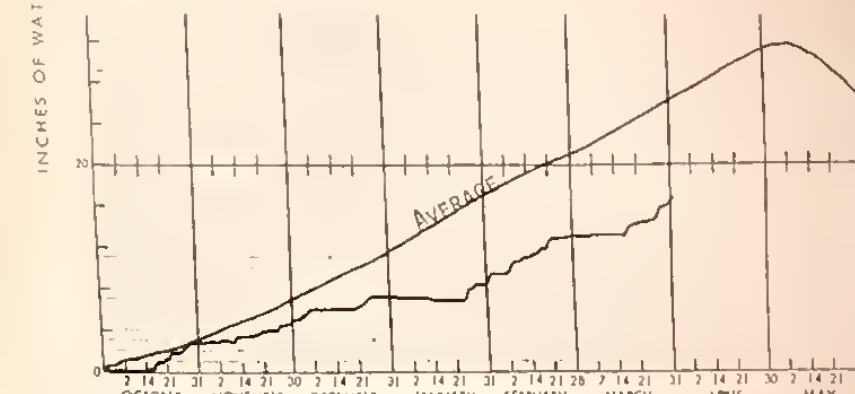
COLE CREEK, elevation 7,850 ft.
Red Lodge Creek - Clarks Fork River Drainages



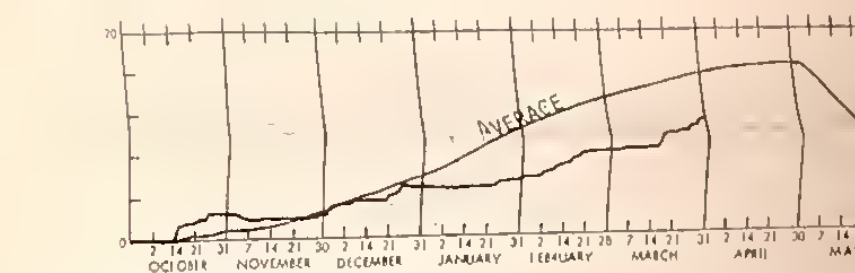
FISHER CREEK, elevation 9,100 ft.
Yellowstone - Boulder - Stillwater - Clarks Fork River Drainages



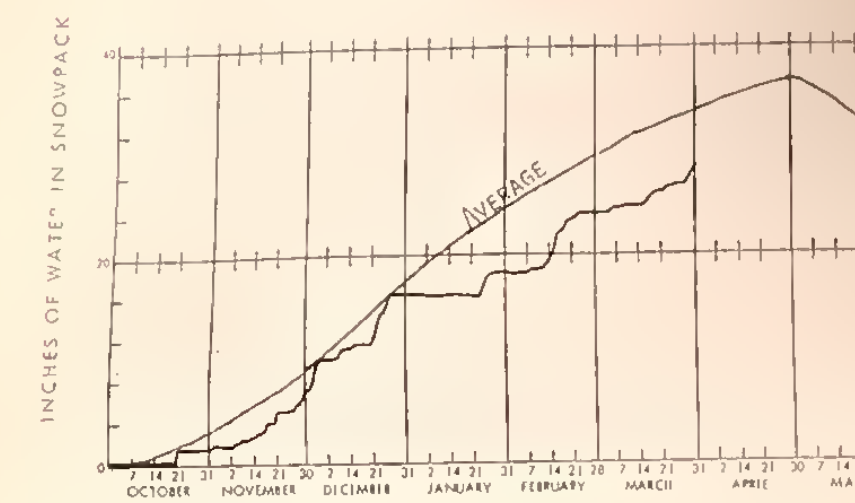
BLACK BEAR, elevation 7,950 ft.
Madison River Drainage



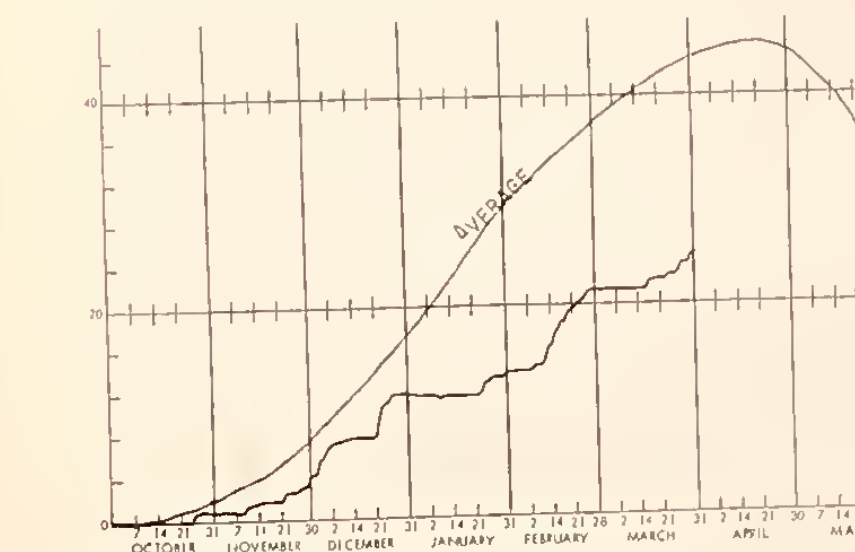
SHONER FALLS, elevation 8,100 ft.
Gallatin - Yellowstone River Drainages



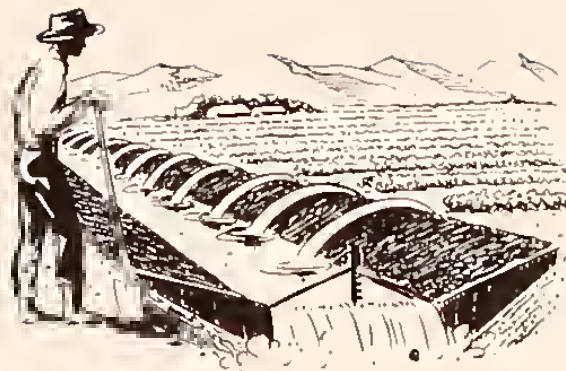
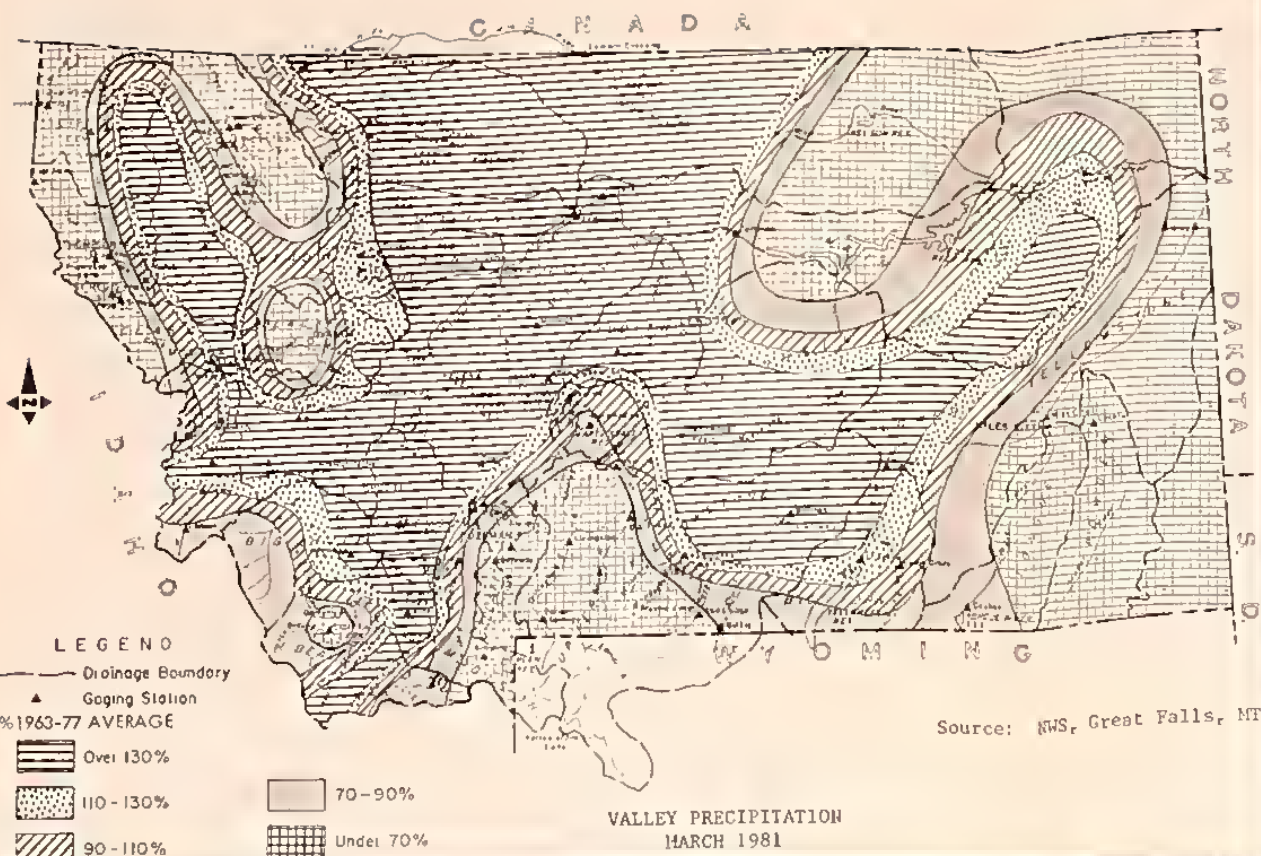
BLACK PINE, elevation 7,100 ft.
Upper Clark Fork River Drainage



STAHL PEAK, elevation 6,050 ft.
Kootenai - Flathead River Drainages



THIN LAKES, elevation 6,510 ft.
Bitterroot River Drainage



SATELLITE SNOW COVER



PROBLEMS ASSOCIATED WITH WATER SHORTAGES

SHOULD I KEEP OR SELL?

Low runoff years can seriously affect livestock operations. Reduced grass and hay production impacts a ranching operation. Lack of runoff in smaller drainages, springs, and stockwater ponds is also a problem that must be dealt with.

Each operation is different. The amount of forage left over from previous years, the feed required to carry the livestock through the winter, the financial level of the operation, previous range management practices, and many other variables are all factors which can affect the operation.

Many operators must decide whether to sell their livestock or buy additional feed to carry their herds until conditions improve.

Those who are faced with this problem may want to discuss alternatives with their financier, county USDA offices, Extension Service, consultants, and others before making any decisions.

DITCHES

Considerable water is lost in getting water from the stream to the field where it is used. To transport water efficiently (with minimum loss) requires a ditch that does not leak, and is free of weeds, grass, debris, and roots.

The slope of ditches should be steep enough to force the water to move freely through the ditch but flat enough to prevent erosion or bank cutting. The slope needs to be uniform so water does not overtop the banks. Inlet structures need to have adequate control so only water that is needed is diverted into the ditch.

Ditches that cross gravelly areas should be sealed to prevent unwanted seepage and loss.

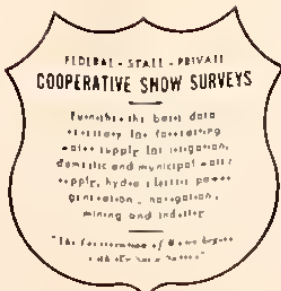
Numerous ditches waste more water than a single large ditch. Consolidation not only decreases water loss, but takes less land out of production, usually has lower maintenance costs and increases the dependability of obtaining irrigation water.

Your local Conservation District or USDA office can help you determine if you could benefit from ditch consolidation.

OVER-IRRIGATION

One problem that develops in a low water year is over-irrigation. Although this appears to be in conflict with the available water supply, an irrigator, being aware that his water supply is limited, has a tendency to keep his fields wetter than normal for fear that he may run out of water. This usually lowers crop yields, makes inefficient use of scarce water supplies, and leaches valuable nutrients from the soil. Irrigators should use only the water needed to mature the crop.

If you would like information on irrigation efficiency, soils, crop varieties, or fertilizer recommendation contact your local Conservation District, USDA, or Extension Service office.



AGENCIES AND ORGANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

GOVERNMENT AGENCIES

Canada

- Department of the Environment
 - Atmospheric Environment Service
 - Water Management Service
- British Columbia Ministry of Environment
 - Inventory and Engineering Branch, Hydrology Section
- Alberta Environment
 - Technical Services Division

Federal

- Department of the Army
 - Corps of Engineers
- Department of Agriculture
 - Forest Service
 - Soil Conservation Service
- Department of Commerce
 - National Environmental Satellite Service
- Department of Interior
 - National Weather Service
 - Bureau of Indian Affairs
 - Fish and Wildlife Service
 - Geological Survey
 - National Park Service
 - Water and Power Resources Service
- Department of Energy
 - Bonneville Power Administration

STATE AGENCIES

- Montana Conservation Districts
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State University - Agricultural Experiment Station
- University of Montana - School of Forestry

PRIVATE ORGANIZATIONS

- The Anaconda Company
- Big Sky of Montana
- Bozeman Water Company
- Flathead Valley Community College
- Montana Power Company

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

DATE	PERCENT SNOW COVER	AVERAGE SNOWLINE ELEVATION IN FEET
November 5, 1980	8	8670
November 16, 1980	94	4450
November 23, 1980	78	5440
November 26, 1980	75E	5590
December 1, 1980	100	3850
December 7, 1980	87	4950
December 13, 1980	55E	6450
December 28, 1980	41	6980
December 31, 1980	31	7370
January 7, 1981	31	7370
January 10, 1981	32	7330
January 18, 1981	37	7120
January 29, 1981	75E	5590
February 4, 1981	82	5230
February 10, 1981	100	3800
February 23, 1981	82	5230
March 1, 1981	72	5720
March 9, 1981	68E	5900
March 10, 1981	58	6330
March 15, 1981	55	6450
March 23, 1981	71	5770
March 28, 1981	77	5490

DATA PROVIDED BY NOAA/NESS